

GRASS SPIDER MICROHABITAT USE IN ORGAN PIPE CACTUS NATIONAL MONUMENT, ARIZONA

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ABSTRACT.—The grass spider (*Agelena naevia*), commonly found in Organ Pipe Cactus National Monument, Arizona, uses rodent burrows located under a shrub canopy more frequently for web construction than burrows located in the open. The average number of prey available in canopy microhabitat was greater than in open microhabitat, and unequal prey abundance may explain spider microhabitat use.

Fixed-web foragers must assess prey abundance when selecting a web site (Riechart 1979). Locomotion, silk production, and respiration while waiting for prey all require energy (Ford 1977). When selecting a web site, spiders might choose a microhabitat that maximizes prey availability. Turnbull (1964) reported that *Achaearanea tepidariorum* (Koch), a web-building spider, used prey availability as an index to determine web location. Webs were placed where wind currents maximized prey availability and minimized web damage. Horton and Wise (1983) found web location in two species of orb-web-building spiders to be affected by the degree of environmental stress. Turnbull assumed (1964) that solar radiation and wind velocity influence web location.

The grass spider (*Agelena naevia*), common to the Sonoran Desert, constructs webs in the openings of rodent burrows. Therefore, microhabitat use may be a consequence of burrow location. Because prey capture should be maximized, microhabitat preference may also be determined by prey abundance. In this paper, I seek to determine whether or not the distribution of *Agelena naevia* is independent of burrow location and whether food availability may be a possible explanation for the preferential use of canopy microhabitat.

MATERIAL AND METHODS

This study was conducted on the desert flats of Organ Pipe Cactus National Monument, Arizona, in late March 1982. The number of

rodent burrows, with and without webs built in the burrow opening, were counted in a 3-by 50-m transect in two microhabitats. Burrows were located in canopy microhabitat if below the downward projection of a bush canopy (normally *Larrea tridentata* or *Ambrosia deltoidea*); otherwise, burrows were in open microhabitat. All animal burrows were considered available for spider occupancy, and I made no attempt to distinguish if rodent burrows were currently being used.

Twelve plastic boards (10 cm²) covered with Tanglefoot were used to assess insect availability. Twelve boards were placed in each microhabitat on each of two successive days. Boards in canopy microhabitat were randomly placed either north, south, east, or west of the bush under the edge of the canopy. Boards in open microhabitat were arbitrarily placed at least 2 m from a bush canopy.

Spider body length (front of head to tip of abdomen) was also measured in each microhabitat using a vernier caliper while randomly searching for webs.

RESULTS

Spider distribution was related to burrow location ($X^2 = 5.37$, $p = .02$). Spiders occupied 33.4% of the burrows in the canopy microhabitat and 4.8% of the burrows in the open microhabitat.

The number of prey were also different between microhabitats (ANOVA, $F = 8.79$, $p < .01$); an average of 1.16 ± 0.9 insects/day were caught in the open microhabitat, and $2.42 \pm$

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1.1 insects/day were caught in the canopy microhabitat.

Significantly larger spiders occurred in the canopy microhabitat ($F = 4.14$, $p < .05$). The mean spider body length was 0.66 ± 0.19 cm ($n = 22$) in the open microhabitat and 0.76 ± 0.19 cm ($n = 29$) in the canopy microhabitat.

DISCUSSION

Greater food abundance may explain the preferential use of canopy microhabitat by *Agelena naevia*. However, other hypotheses include: (1) lower environmental stress in the canopy microhabitat, (2) more suitable strata for web construction in the canopy microhabitat, (3) rodent burrows may not be equally available as sites for web construction in canopy and open microhabitats. These hypotheses are discussed below.

Although Castillo and Eberhard (1983) reported that artificial webs were inaccurate in assessing the exact species composition of prey captured by webs, they do conclude that artificial webs are effective in comparing different properties of the environment (e.g., relative insect abundance). Trapping with sticky plastic boards indicated a greater number of potential prey in the canopy microhabitat. If microhabitat use was based solely on prey abundance, burrows located in canopy microhabitat would be used more often. Increased prey consumption may allow greater growth and reproductive success (Calow 1981).

Less severe environmental conditions may characterize canopy microhabitat. A diminishing of the intense solar radiation of summer should be beneficial in maintaining body temperature at an optimal level. Shrub branches and litter may also provide better physical strata for web construction, resulting in less web destruction and energy for web repair. Eisner and Nowicki (1983) suggested that web destruction resulted not only in the loss of time spent in web repair, but in the loss of valuable proteinaceous silk.

Spiders may choose to establish webs only in inactive (or active?) rodent burrows. If true, then spider residency in a microhabitat is a consequence of the distribution of rodents and the location of inactive rodent burrows. I assumed all burrows were available for spider use and made no distinction with respect to the degree of rodent activity.

At the time of spring hatching, spiders may be seeking burrows. If burrows were limited and canopy microhabitat preferred, competition for web sites might occur. The difference in average spider body length may be evidence of intraspecific competition (Schoener 1974).

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